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Case Report

Effectiveness of Transnasal Sphenopalatine Ganglion Block for Persistent Hiccups Treatment

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Abstract

Statement of the Problem: Hiccups are an involuntarily powerful spasm of the diaphragm, followed by a sudden inspiration with a closure of the glottis. Persistent and intractable hiccups can cause dehydration, insomnia, depression, gastroenteric disorders, such as gastroesophageal reflux, and even death. Treatment options are multiple including conservative treatment, nerve blocks such as the phrenic nerve and sympathetic/parasympathetic ganglion blocks and surgical treatment.

Case Presentation: Case 1. 50 years old man had persistent hiccups during 10 days with insomnia, depression, gastrointestinal disorders. Patient was drug abused, former military person. He had chronic hepatitis C. He was treated with chlorpromazine without any result. After two sided transnasal sphenopalatine ganglion block with 2% lidocaine application during 5 minutes hiccup improved without relapse. No additional treatment was needed. Case 2. 67 years old men with hiccups, insomnia and depression during 7 days. No specific treatment before hospital admission. Concomitant disease – controlled arterial hypertension, ischemic stroke 3 years ago without neurological consequences. As a result of two sided transnasal sphenopalatine ganglion block with 2% lidocaine application during 5 minutes hiccup improved, but after two hours hiccup relapsed with less intensiveness and sphenopalatine ganglion block repeated. Hiccup improved without relapse. No additional treatment was needed.

Conclusion: Sphenopalatine ganglion block is an effective tool for the treatment of persistent hiccup. Due to its simplicity, safety and effectiveness it can serve as a first treatment option of hiccups. In case of hiccup relapse, it can be repeated.

Keywords: Hiccups; Sphenopalatine Ganglion Block; Diaphragm; Phrenic Nerve; Parasympathetic Ganglion

Introduction

Hiccups (Singultus) is familiar to everyone. According to the duration hiccups is classified as acute attack (lasts less than 48 h.), persistent (lasts more than 2 days) and Intractable hiccups which lasts more than 1 month [1,3]. Hiccups commonly are affecting the patients with gastrointestinal or central nervous system diseases [1,4]. Irrespective of the underlying condition, it can impact on patient's quality of life, social interaction and sleep and must be treated. Hiccups treatment is based on its pathophysiology and aimed to inhibit the hiccups reflex arc [1,3,4]. There are different treatment modalities including common conservative and interventional approaches and some uncommon options such as omohyoid muscle injection and stellate ganglion block [1,3-7]. In this article two cases about the use of sphenopalatine ganglion block (SPGB) for persistent hiccups treatment are presented.

Case Presentation

Transnasal sphenopalatine ganglion block is simple and effective tool for treatment of multiple pain conditions and different diseases, which are discussed below. This method is technically easy to perform and has no procedure related complications. For the performing of this procedure is needed only cotton-tripped applicator which passes trhough the middle nasal turbinate until resistant exists. For application 2-4 ml of 2-4% lidocaine recommended with or without 2-4 mg dexamethasone. Application typically lasts during 5-10 min [10,13,15]. By this simple and effective tool previously we have successfully treated postdural puncture headache [12,13] and decided to use this method for persistent hiccups treatment too.

In emergency department of our clinic treated two patients with persistent hiccups.

Case 1

50 years old man had persistent hiccups during 10 days with insomnia, depression, gastrointestinal disorders. Patient was drug abused, former military person. He had chronic hepatitis C. For hiccup he was treated with chlorpromazine without any result. After receiving informed consent two sided transnasal sphenopalatine ganglion block provided by the 2% lidocain application through the transnasal cotton ended catheter-stick. Catheter-stick was inserted through the middle nasal turbinate of each nostril until resistance occured (Figure 1).

Figure 1: From Waldman SD. Atlas of interventional pain management. 4th ed. Philadelphia: Elsevier; 2015.

Lidocaine application time -5 min. Hiccups improved without any future relapse.

Case 2

67 years old men with hiccups, insomnia and depression during 7 days. No specific treatment before hospital admission. Concomitant disease – controlled arterial hypertension, ischemic stroke 3 years ago without neurological consequences. He was former journalist and was in depression condition after retirement. As a result of two sided transnasal sphenopalatine ganglion block with 2% lidocaine application during 5 minutes as described above, hiccup improved. After two hours hiccup relapsed with less intensiveness and sphenopalatine ganglion block repeated. Hiccup improved without any future relapse. Patient discharged at home from emergency department, no additional treatment was needed.

Patients follow up during one month by phone call. No relapse of hiccups.

Discussion

Our experience consists with only two cases of persistent hiccups treatment by the blocking of SPG which due to its anatomic relations can inhibit the affected reflex arc.

The afferent limb of hiccup reflex arc comprises the phrenic nerve, the vagus nerve, and the thoracic sympathetic chain arising from T6-T12. Afferent impulses are transmitting to the hiccup center which includes the proximal spinal cord (C3-C5), the brain stem respiratory center, the reticular activating system in the medulla oblongata, and the hypothalamus. In central processes neurotransmitters, such as dopamine (D) and gamma-aminobutyric acid (GABA) involved [1,3,4]. The efferent limb consists with the phrenic nerve to the diaphragm (C3-C5), nerves to the anterior scalene muscles (C5-C7), the accessory nerves to intercostal muscles (T1-T11), and the recurrent laryngeal branch of the vagus nerve to the glottis. Persistent or intractable hiccups generally occurs if any processes affecting some components of this reflex arc [1,3,4].

Treatment of persistent and intractable hiccups based on the inhibition of hiccups reflex arc. Different pharmacologic, non-pharmacologic and interventional modalities can inhibit this reflex arc and they are using for hiccups treatment. Among them are nasopharyngeal stimulation, vagal stimulation, respiratory manoeuvres, baclofen, gabapentin, metoclopramide, domperidone, chlorpromazine, hypnosis, acupuncture, nerve block (c3–c5, phrenic, vagal nerve) cervical epidural anesthesia, stellate ganglion block, implantation of vagal nerve stimulator or similar

neuromodulation device [1,3-7]. Sphenopalatine ganglion block also proposed as a possible treatment option of intractable hiccups [9] but in current literature we have not found the case report about the use of SPGB for hiccups treatment.

The sphenopalatine ganglion has polysynaptic neural connections with different neural structures, cranial nerves and also to various parts of the brain, including hypothalamus, amygdala, and insular cortex (Figure 2). As a result, SPG is a junction of sympathetic, parasympathetic, and sensory nerves overlapping in a small area [2,10]. Indications for SPGB are multiple: Musculoskeletal, vascular and neurogenic pain, cluster headache, migraine, trigeminal neuralgia, postdural puncture headache, herpes zoster, paroxysmal hemicrania, cancer of the head or neck, facial pain that is atypical, complex regional pain syndrome, temporomandibular disorder, nasal contact point headache, vasomotor rhinitis, low back pain, visceral pain as well as angina, sciatica, and arthritis, anxiety, broncho-spasm and chronic hiccup [9-14,16].

Figure 2: Anatomy of the sphenopalatine ganglion (SPG) and associated structures. The SPG is triangular shaped, located in the pterygopalatine fossa, and suspended from the maxillary nerve via the two pterygopalatine nerves. Posteriorly, it is connected to the Vidian nerve formed by the greater petrosal and the deep petrosal nerves. Efferent branches from the ganglion include the superior posterior lateral nasal, nasopalatine, greater and lesser palatine, and pharyngeal nerves. Caudally the ganglion is in direct connection with the greater and lesser palatine nerves. Source: Reprinted with permission, Cleveland Clinic Center for Medical Art & Photography ß 2005–2013. All rights reserved.

Although the exact mechanism by which SPGB terminates hiccups is not known, there is a possibility that the hiccups stop with the blockade of the sympathetic nervous system through the postganglionic nerve fibers. In the cases of our patients, the sympathetic nerve block due to SPGB may have been effective on the hiccup reflex arc. The sympathetic fibers enter the sympathetic chain to the brain through the sphenopalatine ganglion and it is possible that the SPGB inhibited the hiccup reflex arc during this process.

SPGB has also the remote effects including psychosomatic symptoms, rage reaction, pain, and spasm. Therefore, it can be effective against hiccup too. Hee-won Son., *et al*. proposed the possible mechanism of stellate ganglion block effectiveness based on the regulation of nerve growth factor level [7]. Similarly, like stellate ganglion block, one of the explanations of SPGB effectiveness might be the regulation of NGF level. Particularly, body responds to acute and chronic stress by increasing levels of NGF and its transport to the autonomous nerve ganglions [8]. Increased NGF in the autonomous nerve ganglion promotes nerve growth at the sympathetic end terminals, which, leads to increased brain norepinephrine (NE) levels triggering hot flashes, and post-traumatic stress-disorder (PTSD) [7,8]. Injection or application of local anesthetic to the sphenopalatine ganglion reverses this cascade. Finally, effect of SPGB contains central and systemic sympathetic nervous system modulation.

Conclusion

Persistent hiccups had been successfully treated in both cases using SPGB. According to our results we can conclude, that SPGB might be an effective tool for the treatment of this pathologic condition. Although our experience is limited with only two cases, we can recommend, that due to its simplicity, safety and effectiveness it can serve as a first treatment option of hiccups and can be used as a self-employment. Large clinical studies are needing for definition of SPGB effectiveness in persistent/ intractable hiccups treatment.

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